

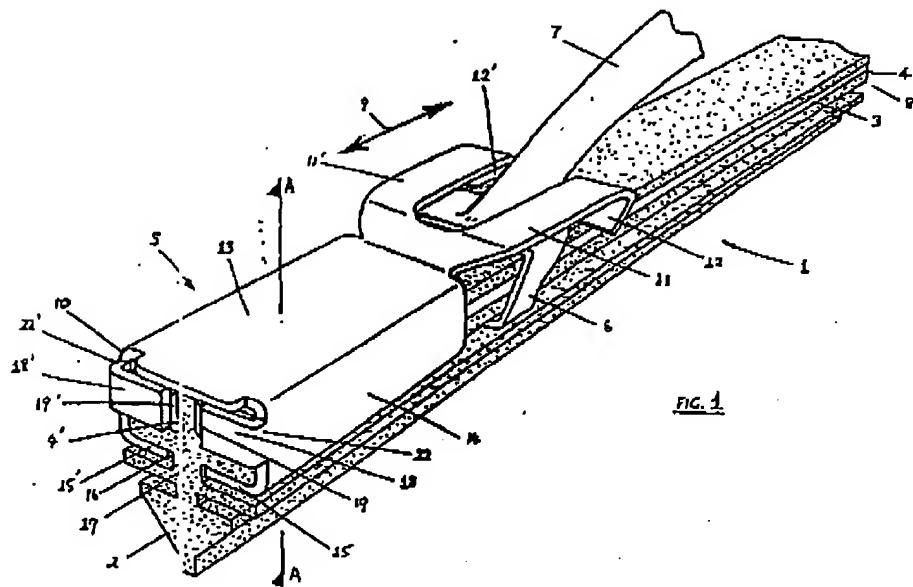
(12) UK Patent Application (19) GB (11) 2 336 293 (13) A

(43) Date of A Publication 20.10.1999

(21) Application No 5908120.0	(51) INT CL <sup>6</sup> B60S 1/38
(22) Date of Filing 12.04.1999	(52) UK CL (Edition Q ) A4F FAJ F40
(30) Priority Data (31) PP2988	(32) 16.04.1999 (33) AU
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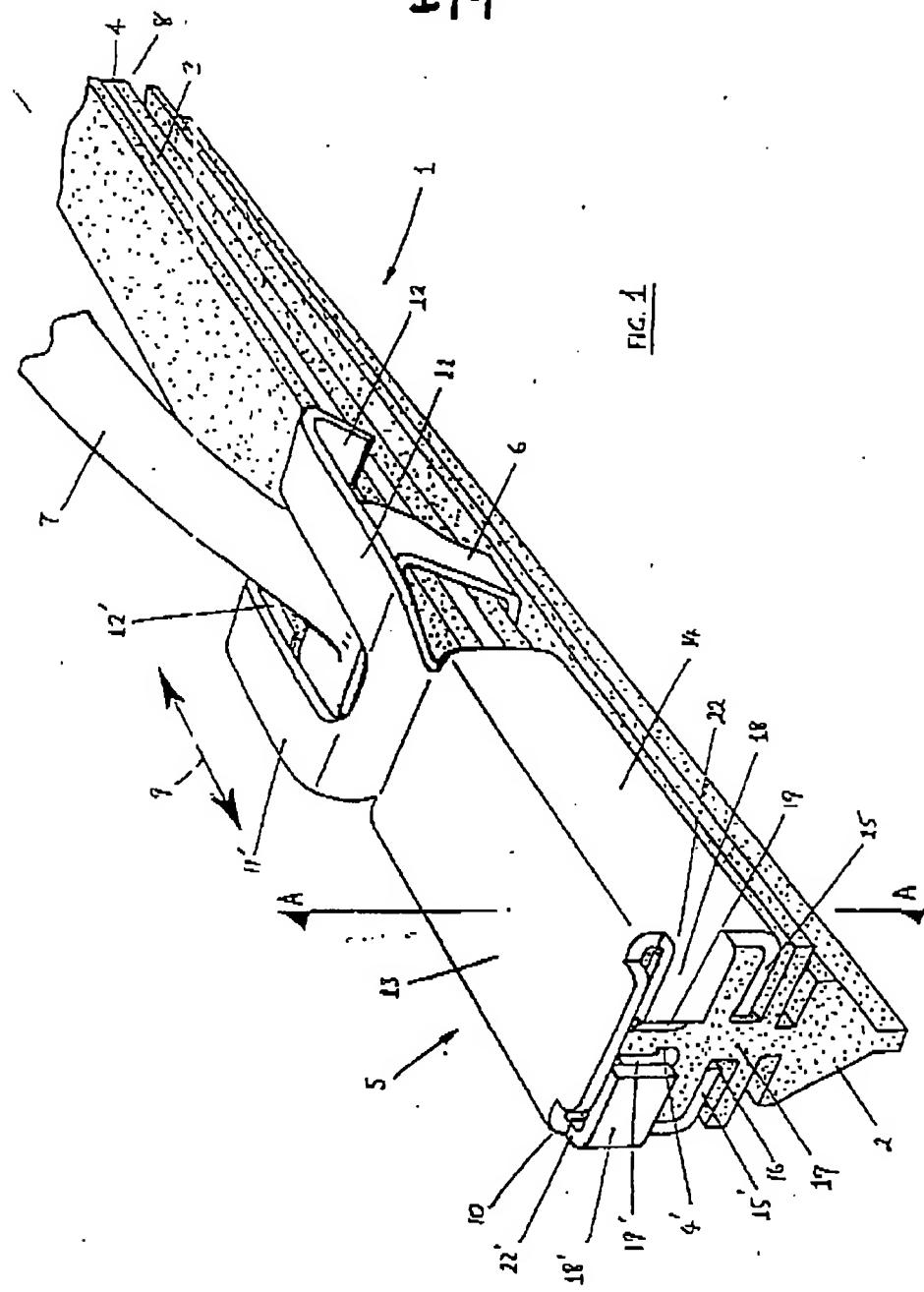
(54) Abstract Title  
**Wiper blade retaining clip; assembling wiper blades and harnesses**

(57) A clip 5 is provided both to limit longitudinal movement of a wiper blade assembly 1 relative to a harness member 7 and so prevent separation of the wiper blade assembly from the harness and also to prevent longitudinal separating movement of stiffening strips 3, relative to the wiper element 2. To this end, the clip 5 has two legs 11, 11' which extend from a body portion 10, which pass over a claw 6 and on either side of the harness member 7, and which have hook portions 12, 12'. The claw 6 is trapped between the body portion 10 of the clip 5 and the hook portions 12, 12' of the legs 11, 11', thereby to limit longitudinal movement of the wiper blade assembly 1 relative to the harness member 7. The clip may be formed from a blank in situ by means of a press as the blade is assembled.

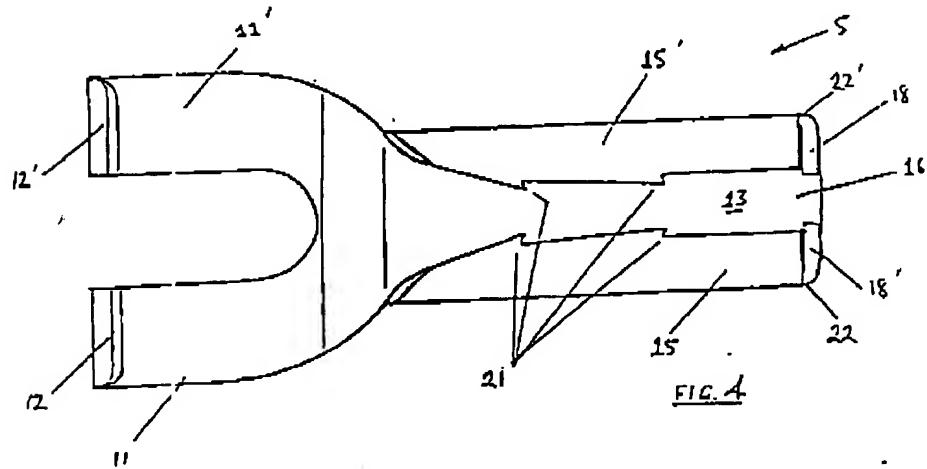
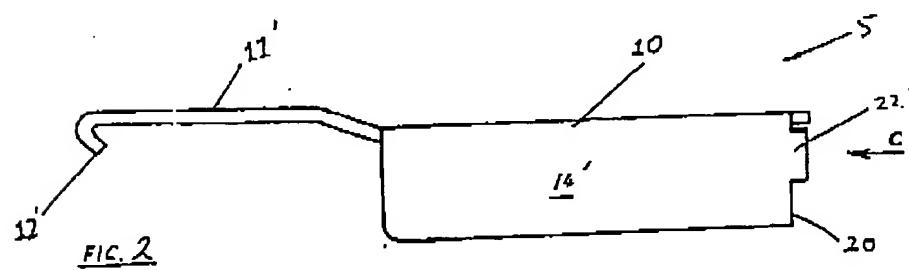
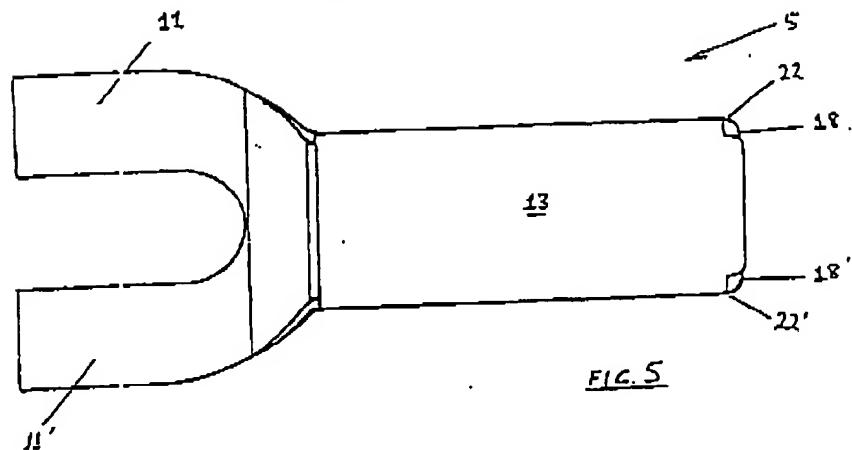


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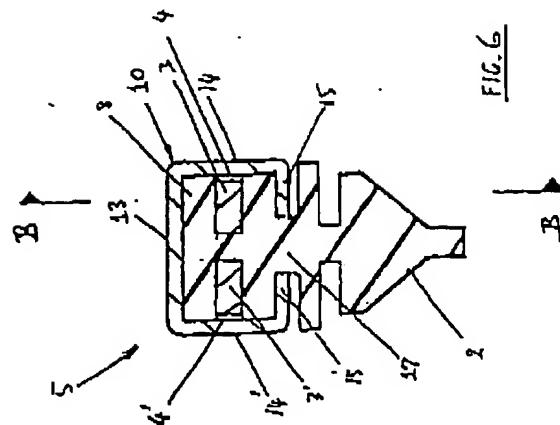


FIG. 6

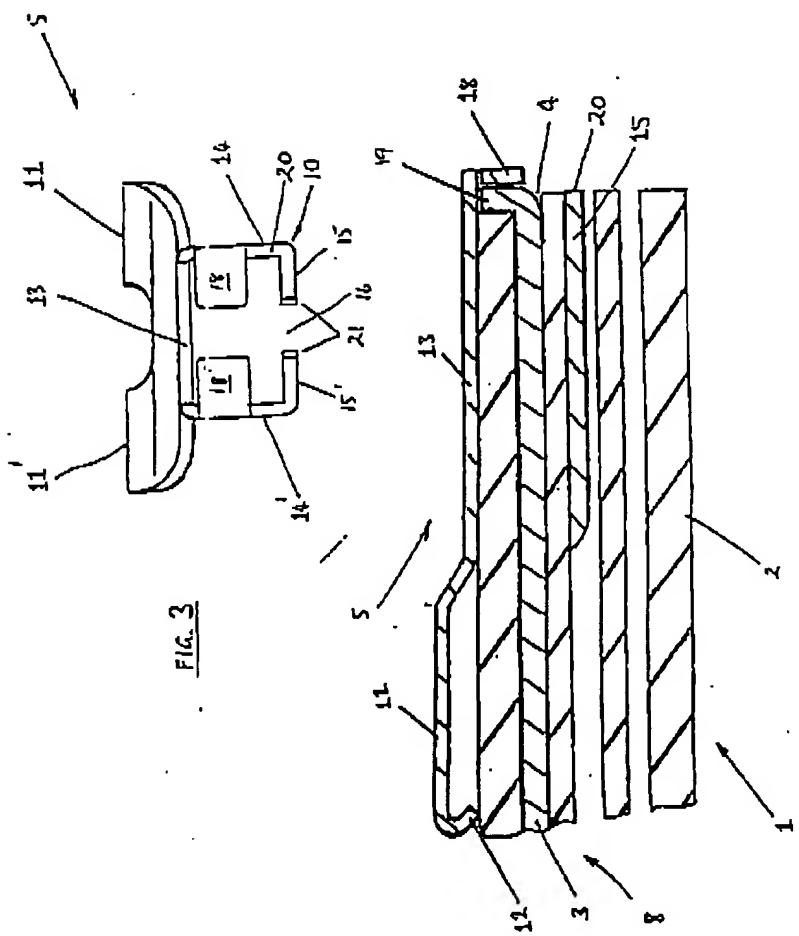
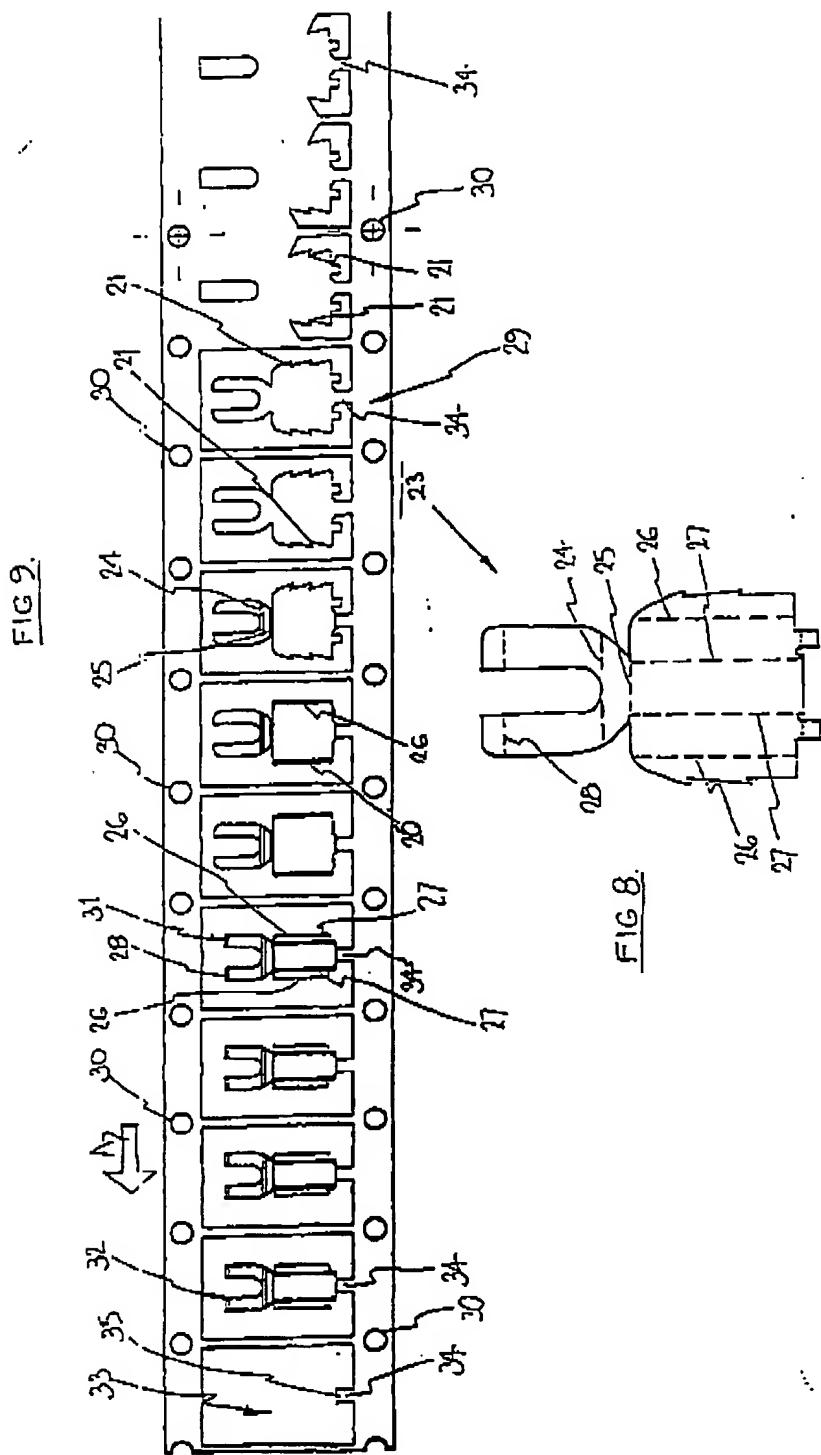


FIG. 7

4 | 4



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WIPER BLADE ASSEMBLY AND RETAINING CLIP THEREFOR

This invention relates to wiper blade assemblies such as are used in automotive windscreens.

Many modern automotive windscreens wiper arms comprise a multiple 5 yoke harness, within which is fitted a replaceable wiper blade assembly. The harness usually comprises a main yoke, attached centrally to a wiper arm and having a pair of subsidiary yokes pivotally attached in their central regions to the ends of the main yoke. These subsidiary yokes may carry one or more further yokes. The arrangement of yokes is usually such that a flexible wiper blade 10 assembly secured to the ends of certain of the yokes is urged against the windscreens with approximately equal forces at each of the said certain yokes when the main yoke is urged by a force applied at its centre towards the windscreens.

In a particularly simple and popular arrangement, the ends of the yokes to 15 which the wiper blade assembly is secured are provided with claws which are adapted to engage in longitudinal slots in the wiper blade assembly. The wiper blade assembly itself comprises an elongate wiper element of rubber or the like and at least one (usually two) stiffening strips (also known as "rails") each received in a longitudinal slot in the wiper element. The claws partially surround 20 a head portion of the wiper blade assembly, which includes the stiffening strips' slots, and have three functions. First they hold the wiper blade assembly in the correct orientation against the windscreens for wiping. Second, they allow a longitudinal slicing movement of the wiper blade assembly with respect to the harness so that the wiper blade assembly can follow the curvature of the 25 windscreens while moving over it. Third, they retain the stiffening strips in their respective slots in the wiper element along its length.

This arrangement is popular at least in part because of its simplicity of manufacture in that the wiper element is a constant-cross-section extrusion and the stiffening strip or strips are particularly simple.

30 It is of course necessary in this arrangement that the wiper blade assembly be prevented from moving out of engagement with the claws and that the wiper element and stiffening strips be prevented from moving longitudinally

relative to each other. A number of arrangements have been devised for these purposes.

By way of example, Bollen *et al* describe in PCT Application no. PCT/DE93/000813 a clip for use at a single end of a wiper arrangement of the type described above. The clip has a body portion with internal projections which cooperate with corresponding recesses in the stiffening strips to prevent their movement in the body portion, further internal projections and an end wall adapted to restrain the wiper element against longitudinal movement in the body portion, and parallel legs extending from the body portion. In use, the clip is located at an end of the wiper blade assembly, hence outboard of a claw and the legs extend along sides of the claw and are latched together at their ends inboard of the claw thereby to retain the wiper blade assembly in the harness.

Although only one such clip is required on the wiper blade assembly, this arrangement requires attention to latching the legs during installation, and if this is forgotten or incompletely done the wiper blade assembly may not be retained in the harness. The clip does not lend itself to production in metal due to the requirement of a latching mechanism on the legs and requires the formation of recesses in the stiffening strips.

Burton and Volkoff, in Australian Patent Application no. 74325/94 describe a clip intended for use at both ends of a wiper blade assembly of the type described above. This clip also has a body portion with internal projections receivable in cooperating recesses in the stiffening strips, and has an end wall so that the end walls of two clips at opposite ends of the wiper blade assembly together prevent longitudinal movement of the wiper element relative to the stiffening strips. The two clips can bear against the two endmost claws of the harness so that the wiper blade assembly is retained in the harness. A disadvantage of this arrangement, in addition to the need for recessed stiffening strips, is the need for two clips.

The present invention allows a wiper blade assembly to be installed in a harness by pushing the wiper blade assembly through the claws of the harness until it is fully engaged therein, and includes a clip of which only one is required per wiper blade assembly.

The invention is suited to wiper blade assemblies having a constant-cross-section wiper element and stiffening strips of constant or substantially constant cross-section.

The clip included in the invention is suitable for production in either 5 plastics or metal and, if of metal, can be assembled to a wiper element and stiffening strips in the course of being formed.

These features lend themselves particularly to application of the invention in the replacement wiper blade assembly market. For example, it is possible to stock wiper blade assemblies of a single length and before installation trim them 10 to a required length at the end opposite the end having the clip.

#### Summary of the Invention

The invention provides a clip for retaining an elongate wiper blade assembly in a wiper mechanism including a harness having a claw for connecting said harness to the wiper blade assembly, said clip including:

15 a body portion secured to the wiper blade assembly; and at least one leg connected to said body portion and having a free end with a hook portion thereat, wherein in use the body portion is located longitudinally outward of the claw, the or each said leg extends over the claw and the hook portion is located longitudinally inward of the claw, thereby to retain the wiper blade assembly 20 within the claw and to limit longitudinal movement of the wiper blade assembly within the harness;

#### Preferred Aspects of the Invention

Preferably the clip has two said legs, and in use of the clip the two legs are located adjacent to opposite sides of a harness member to which the claw is 25 attached. Conveniently, the or each said leg is located on the same side of the wiper assembly as the harness.

Preferably the or each said leg is resilient, at least to the extent that when the wiper blade assembly together with an applied clip is pushed through the claw, the leg or legs flex enabling the portion or portions to ride over the claw 30 and thereafter spring back so that the claw is retained between the body portion and the hook portion or portions.

In a particularly preferred aspect, the wiper blade assembly is provided including a wiper element and at least one stiffening strip received in a first longitudinal groove in a side of the wiper element and the body portion includes means for retaining the wiper element against longitudinal movement relative to the body portion and means for retaining the or each said stiffening strip against longitudinal movement relative to the body portion.

Preferably in this aspect, the body portion includes a channel section having a base and two sidewalls, each sidewall having a free edge with a projection therealong extending inwardly of the channel and receivable in one of two further longitudinal grooves in the wiper element and the means for retaining the wiper element in the body portion includes a barb on the base or on at least one of the said projections, which barb is adapted to grip the wiper element.

The each or said stiffening strip may be retained against longitudinal movement relative to the body portion (and therefore also relative to the wiper element) in at least a first direction by an inwardly extending abutment means positioned to engage with an end region of the or each said stiffening strip.

In one embodiment, the abutment means may be formed by a wall portion extending inwardly from at least one of the base, a sidewall, both sidewalls, the projection or both said projections of the body portion. In this embodiment, when only one clip is provided for each wiper blade assembly the stiffening strip (or strips) may have an end portion bent downwardly or upwardly to engage with an end zone of the wiper element to prevent movement of the stiffening strip (or strips) in an opposite direction to said first direction, relative to said wiper element.

Alternatively, a second clip may be provided at the other end of the wiper assembly, said second clip being adapted to prevent relative movement between the wiper element and the or each stiffening strip (in the same way as the first clip or otherwise) and in this case, the stiffening strip (or strips) do not need to be deformed.

In a still further possible embodiment, the abutment means may be engageable within a recess formed in a longitudinal side edge of the or each said stiffening strip. In this embodiment, the abutment means will prevent longitudinal movement of the stiffening strip (or strips) in either direction relative to the wiper element when of course the wiper element is fixed relative to the body portion.

5 The clip in any of the above aspects may be formed of a plastics material. Alternatively, the clip may be formed of metal. In this case it is preferred that the metal be pre-painted metal.

A wiper blade assembly comprising a wiper element, at least one reinforcing strip and a clip in any of the forms disclosed above is within the scope of the invention.

10 Where the clip is formed of metal, the invention provides in another aspect a method of manufacturing a wiper blade assembly as disclosed in the previous paragraph including the steps of : forming an assembly comprising the wiper element and the or each stiffening strip; and in one or more press means, providing a blank adapted to be so manipulated in said press means as to form the clip and forming the clip in place on the said assembly from the said blank. Preferably, the blank is detached from a continuous strip of metal.

15 Where the or each stiffening strip has a projection at an end, as disclosed above, the method preferably further includes a step of forming said projection as press operation after assembly of the or each stiffening strip to the wiper element.

The invention will now be described in more detail by way of a non-limiting example, with reference to the following diagrams.

20 25 Figure 1 is a perspective partial view of a wiper blade assembly with clip, all according to the invention and fitted to a wiper harness member.

Figure 2 is a side elevation of the clip shown in Figure 1.

Figure 3 is an end elevation of the clip shown in Figure 1, seen in the direction of the arrow C in Figure 2.

30 Figure 4 is a plan view from below of the clip shown in Figure 1.

Figure 5 is a plan view from above of the clip shown in Figure 1.

Figure 6 is a cross-section of the wiper blade assembly shown in Figure 1

taken at the line A-A.

Figure 7 is a partial cross section of the wiper blade assembly shown in Figure 1, taken at the line B-B.

Figure 8 is a plan view of a face of a sheet material blank suitable for formation into the clip shown in Figure 1.

Figure 9 is a plan view of a strip of sheet material showing a sequence of steps to form the clip shown in Figure 1 to be applied to the end of a wiper blade assembly.

Referring first to Figure 1, there is shown a wiper blade assembly 1 of an automotive windscreens wiper, having a wiper element 2 of rubber or the like and two stiffening strips 3, 3' received in longitudinal grooves 4, 4' in the wiper element 2. The wiper element 2 and the stiffening strips 3, 3' are retained in a clip 5, which is located at one end of the wiper assembly 1. The wiper assembly 1 is retained in a claw 6 formed at an end of a harness member 7 which is one of several such harness members, each having a pair of spaced claws similar to the claw 6 and comprised in a pressure-distributing harness (not shown) for the wiper blade assembly 1, such as is well known in the automotive art. The claw 6 partly surrounds a head portion 8 of the wiper blade assembly 1 and permits the wiper blade assembly 1 to move longitudinally relative to the harness member 7, i.e. in the directions of arrow 9. Such freedom of movement is necessary at all but one of the claws of the harness to enable the wiper blade assembly 1 to follow the contour of a windscreen.

The clip 5 is intended both to limit longitudinal movement of the wiper blade assembly 1 relative to the harness member 7 and so prevent separation of the wiper blade assembly from the harness and also to prevent longitudinal separating movement of the stiffening strips 3, 3' relative to the wiper element 2. To this end, the clip 5 has two legs 11, 11' which extend from a body portion 10, which pass over the claw 6 and on either side of the harness member 7, and which have hook portions 12, 12'. The claw 6 is trapped between the body portion 10 of the clip 5 and the hook portions 12, 12' of the legs 11, 11', thereby to limit longitudinal movement of the wiper blade assembly 1 relative to the harness member 7. (Although in Figure 1 limited movement of the claw 6

relative to the clip 5 is clearly possible, the legs 11, 11' could if desired be made shorter to actually prevent such relative movement.)

The legs 11, 11' may be substantially rigid but capable of flexing so as to allow the hook portions 12, 12' to pass over the claw 6 as the wiper blade assembly 1 is fed through the claw 6 and thereafter to take up a position wherein they bear against the claw 6. This may, in an alternative arrangement be achieved by providing substantially rigid legs 11, 11' with little or no flexibility in themselves. With such an arrangement the flexibility provided by the rubber or elastomeric wiper element 2 is sufficient to allow the hook position 12, 12' to ride over the claw 6. In a still further but less preferred arrangement, the legs 11, 11' may be provided in a bent upwards configuration so that the hook portion or portions may clear the claw 6 during installation of the wiper assembly and thereafter be plastically deformed downwardly by the user behind the claw 6. As noted above, it is preferred that the legs 11, 11' and the hook portions 12, 12' all spring resiliently into position after passing over the claw 6. It is to be noted that passing the legs 11, 11' over the claw 6, instead of beside it and instead of between the claw 6 and the top surface of the head portion 8 of the wiper blade assembly 1 has been found to make the clip 5 easier to design for application to a range of harnesses, and therefore to suit the spare parts market. For example, for the legs 11, 11' to pass between the claw 6 and the top of the wiper blade assembly 1, adequate clearance would have to be available, an issue that does not arise with the clip 5.

The clip 5 also retains within a body portion 10 both the stiffening strips 3, 3' and the wiper element 2 so that longitudinal movement of the strips 3, 3' and wiper element 2 relative to the body portion 10, and each other, is prevented and no corresponding clipping is needed at the other end of the wiper blade assembly 1. The claw 6 (like other claws in the harness) retains the stiffening strips 3, 3' in the grooves 4, 4', along their lengths to stiffen the wiper blade assembly.

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The body portion 10 of the clip 5 is generally channel-sectioned, having a base 13 and two sidewalls 14, 14'. Along free edges of the sidewalls 14, 14' there

are provided projections 15, 15'. As best seen in Figure 6, the channel-sectioned body portion 10 surrounds the head portion 8 of the wiper blade assembly save for a gap 16 between the projections 15, 15' through which passes a web 17 of the wiper element 2. To ensure that the wiper element 2 is prevented from moving longitudinally in either direction relative to the clip 5, barbs 21 formed along the projections 15, 15' grip the web 17. As an alternative to the barbs 21, inwardly directed tabs can be formed from the base 13 engaging frictionally into the top face of the wiper element 2. Tabs 18, 18' protrude from extensions 22, 22' of the side walls 14, 14' and conveniently bear against both a portion of an end face of the wiper element 2 and an end region of the stiffening strips 3, 3'. To ensure that the stiffening strip 3, 3' are prevented from moving longitudinally relative to the wiper element 2, upstanding projections 19, 19' are bent from ends of the strips 3, 3' which engage with a portion of the end face of the wiper element 2. Thus, as shown in Figure 7, the strip 3 is prevented from moving to the right by engagement of the strip 3 with the tab 18 and it is prevented from moving to the left by the projection 19 engaging the wiper element 2. If desired, the projections 19, 19' formed at ends of the strips 3, 3' may be trapped between the tabs 18, 18' and an end face 20 of the body portion 10, for example by bending the projections 19, 19' in the direction opposite to that shown in Figure 7. In this embodiment, strips 3, 3' are fixed relative to the clip 5.

In the arrangements thus described, the rubber of the wiper element 2 is fixed relative to the clip 5 by the barbs 21 (or their equivalent) engaging with the wiper element 2. The clip 5 is retained relative to the harness by the hook portions 12, 12' and the body portion 10 being located on either side of the claw 6. The stiffening strips 3, 3' are retained relative to the wiper element 2 by the tabs 18, 18' engaging an end of the strips 3, 3' and by the projections 19, 19' acting as an abutment against an end zone of the wiper element 2, or by being retained between the tabs 18, 18' and an end face 20 of the clip 5. In an alternative embodiment particularly useful when the clip 5 is made from moulded plastics material, internal projections can be provided from the side walls 14, 14' engageable in recesses formed on side edges of the strips 3, 3'.

The clip 5 is also suited for forming from a single blank of sheet metal, preferably pre-painted, by normal press operations such as shearing and folding. A blank 23 suitable for formation into the clip 5 is shown in Figure 8, wherein fold lines 24, 25, 26, 27 and 28 are indicated by dotted lines.

- 5        Although the clip 5 may be formed from individual blanks of the type shown in figure 8, in commercial production, processing may occur as shown in figure 9 and described below in relation to this figure. In this form of processing, a prepainted strip of metal 29 provided with indexing holes 30 is fed into a multi die press tool. In the illustration the strip is fed in the direction of arrow A one  
10 step at a time with each press stroke. With each press stroke a series of separate shearing or bending operations occur to form a clip member as shown at 31 secured to the strip 29 by only a small strand of material 34. At position 31 to position 32, the side walls 14, 14' are splayed apart allowing easy insertion of an end of a wiper element 2 with two stiffening strips 3, 3' inserted in their  
15 grooves in the wiper element 2. At the final step 33, the side walls 14, 14' are pressed inwardly thereby engaging the barbs 21 into the wiper element 2 and the clip member is severed at 35 from the strip 29. In this way, a final wiper blade assembly is formed. The wiper element and stiffening strips 2, 3 and 3'  
20 may be manually inserted at positions 31 to 32 or may be automatically handled  
robotically or by some other feed machinery.

Many other variations may be made in the components and methods described above without departure from the spirit and scope of the invention.

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CLAIMS

1. A clip for retaining an elongate wiper blade assembly in a wiper mechanism including a harness having a claw for connecting said harness to the wiper blade assembly, said clip including: a body portion for securing to the wiper blade assembly; and at least one leg connected to said body portion and having a free end with a hook portion thereat, wherein, in use, the body portion is located longitudinally outward of the claw, the or each said leg extends over the claw and the hook portion is located longitudinally inward of the claw, thereby to retain the wiper blade assembly within the claw and to limit longitudinally movement of the wiper blade assembly within the harness.

15 2. A clip according to claim 1 having two said legs, such that, in use of the clip, the two legs are located adjacent to opposite sides of a harness member to which the claw is attached.

20 3. A clip according to claim 1 or claim 2, wherein, in use, the or each said leg is located on the same side of the wiper assembly as the harness.

25 4. A clip according to any one of claims 1 to 3, wherein the or each said leg is resilient, at least to the extent that when the wiper blade assembly together with an applied clip is pushed through the claw, the leg or legs are able to flex, enabling the portion or portions to ride over the claw and thereafter spring back so that the claw will be

retained between the body portion and the hook portion or portions.

5. A wiper blade assembly incorporating a clip according to any one of claims 1 to 4.

5 6. An assembly according to claim 5 including a wiper element and at least one stiffening strip received in a first longitudinal groove in a side of the wiper element and the body portion includes means for retaining the wiper element against longitudinal movement relative to the body 10 portion and means for retaining the or each said stiffening strip against longitudinal movement relative to the body portion.

15 7. An assembly according to claim 6, wherein the body portion includes a channel section having a base and two sidewalls, each sidewall having a free edge with a projection therealong extending inwardly of the channel and receivable in one or two further longitudinal grooves in the wiper element and the means for retaining the wiper element in the body portion includes a barb on the base or on at 20 least one of the said projections, which barb is adapted to grip the wiper element.

25 8. An assembly according to claim 6 or claim 7, wherein the or each said stiffening strip is retained against longitudinal movement relative to the body portion (and therefore also relative to the wiper element) in at least a first direction by an inwardly extending abutment means positioned to engage with an end region of the or each said stiffening strip.

9. An assembly according to claim 8, wherein the abutment means is formed by a wall portion extending inwardly from at least one of the base, a sidewall, both sidewalls, the projection or both said projections of the  
5 body portion.

10. An assembly according to claim 9, wherein one clip is provided for the wiper blade assembly, and the or each stiffening strip has an end portion bent downwardly or upwardly to engage with an end zone of the wiper element to prevent movement of the stiffening strip in an opposite direction to said first direction, relative to said wiper element.  
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11. An assembly according to claim 10, including a second clip provided at the other end of the wiper assembly,  
15 said second clip being adapted to prevent relative movement between the wiper element and the or each stiffening strip (in the same way as the first clip or otherwise).

12. An assembly according to claim 7, wherein abutment means is engageable within a recess formed in a longitudinal side edge of the or each said stiffening strip.  
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13. A method of manufacturing a wiper blade assembly as claimed in any one of claims 5 to 12 and including the steps of : forming an assembly comprising the wiper element and the or each stiffening strip; and in one or more press means, providing a blank adapted to be so manipulated in said press means as to form the clip and forming the clip in place on the said assembly from the said blank.  
25

14. A method according to claim 13, wherein the or

13

each stiffening strip has a projection at an end, and the method further includes a step of forming said projection as a press operation after assembly of the or each stiffening strip to the wiper element.

- 5        15. A clip, a wiper blade assembly or a method of manufacturing a wiper blade assembly and substantially as described herein with reference to the accompanying drawings.